CONTENTS

Preface xvii
Acknowledgments xix
Biography of Gabriella Baki xxi
Biography of Kenneth S. Alexander xxiii

1 General Concepts 1

Section 1: Basic Definitions 1
Learning Objectives, 1
Key Concepts, 2
What is Cosmetic Science? 2
Basic Definitions, 4
How is a Product’s Intended Use Established in the United States? 10
Popular Cosmetic Claims, 10
A Special Category: Soap, 18
Glossary of Terms for Section 1, 19
Review Questions for Section 1, 20
References, 23

Section 2: Classification of Cosmetics and OTC Drug–Cosmetic Products. 25
Cosmetic Ingredients and Active Ingredients used in Cosmetics and OTC
Drug–Cosmetic Products, 25
Learning Objectives, 25
Key Concepts, 26
CONTENTS

Classification of Cosmetics and OTC Drug–Cosmetic Products, 26
Major Ingredient Types in Cosmetics and OTC Drug–Cosmetic Products and their Functions, 28
Glossary of Terms for Section 2, 45
Review Questions for Section 2, 47
References, 49

Section 3: Dosage Forms for Cosmetics and OTC Drug–Cosmetic Products, 50
Learning Objectives, 50
Key Concepts, 51
  What is a Dosage Form? 52
  Dosage Forms for Cosmetic Applications, 53
Glossary of Terms for Section 3, 63
Review Questions for Section 3, 64
References, 67

2 Legislation for Cosmetics and OTC Drug–Cosmetic Products

Section 1: Current Rules and Regulations for Cosmetics and OTC Drug–Cosmetic Products in the United States and European Union, 69
Learning Objectives, 69
Key Concepts, 70
  Introduction, 71
  Regulation in the United States, 72
  Regulation in the European Union, 80
  Import of Products, 84
  Recalls, 84
Glossary of Terms for Section 1, 85
Review Questions for Section 1, 85
References, 88

Section 2: Labeling Tutorial for Cosmetics and OTC Drug–Cosmetic Products Marketed in the United States, 90
Learning Objectives, 90
Key Concepts, 91
  Introduction, 92
  Definitions, 92
  Cosmetic Products, 94
  OTC Drug–Cosmetic Products, 98
  INCI Naming, 101
  How do you Know the Exact Composition of a Cosmetic Product or OTC Drug–Cosmetic Product? 102
Glossary of Terms for Section 2, 103
CONTENTS

Review Questions for Section 2, 104
References, 108

Section 3: Government and Independent Organizations in the Cosmetic Industry, 109
Learning Objectives, 109
Key Concepts, 109
Introduction, 110
Food and Drug Administration, 110
Center for Food Safety and Applied Nutrition, 111
Center for Drug Evaluation and Research, 111
Personal Care Product Council, 111
Cosmetic Ingredient Review Panel, 111
Federal Trade Commission, 112
European Commission, 112
Scientific Committee on Consumer Safety, 113
Cosmetics Europe – the Personal Care Association, 113
Glossary of Terms for Section 3, 113
Review Questions for Section 3, 114
References, 116

Section 4: Cosmetic Good Manufacturing Practices, 116
Learning Objectives, 116
Key Concepts, 117
Cosmetic Good Manufacturing Practices, 117
Glossary of Terms for Section 4, 122
Review Questions for Section 4, 123
References, 124

3 Skin Care Products, 125

Introduction, 125

Section 1: Skin Anatomy and Physiology, 126
Learning Objectives, 126
Key Concepts, 127
Introduction, 127
Structure and Function of Human Skin, 128
Epidermis, 128
Dermis, 132
Hypodermis, 133
Moisture Content of Normal Skin, 133
Skin Flora and Skin pH, 135
Surface Charge of Normal Skin, 135
SKIN TYPES, 136
Skin Types Based on Hydration State and Lipid Content, 137
Skin Types Based on Gender, 139
Glossary of Terms for Section 1, 140
Review Questions for Section 1, 141
References, 144

Section 2: Skin Cleansing Products, 147
Learning Objectives, 147
Key Concepts, 148
Introduction, 149
Types and Definition of Skin Cleansing Products, 150
History of Using Skin Cleansing Products, 150
How Skin Cleansing Products May Affect the Skin? 152
Required Qualities and Characteristics and Consumer Needs, 154
Cleansing Products – Basic Concepts, 155
Classification Based on Chemical Nature and Mildness, 155
Classification Based on Cleaning Principle, 156
Classification Based on Foamability, 157
Classification Based on Product Types, 157
Typical Ingredients and Formulation of Skin Cleansing Products, 158
Face, 158
Body, 164
Hand, 170
Considerations When Selecting Skin Cleansing Products, 175
Typical Quality Problems of Skin Cleansing Products, 176
Evaluation of Skin Cleansing Products, 180
Quality Parameters Generally Tested, 180
Efficacy (Performance) Parameters Generally Tested, 190
Ingredients Causing Safety Concerns, 191
Packaging of Skin Cleansing Products, 194
Glossary of Terms for Section 2, 194
Review Questions for Section 2, 196
References, 199

Section 3: Skin Moisturizing Products, 204
Learning Objectives, 204
Key Concepts, 205
Introduction, 206
Types and Definition of Skin Moisturizers, 206
History of Using Skin Moisturizers, 207
How Skin Moisturizers May Affect the Skin? 208
Required Qualities and Characteristics and Consumer Needs, 210
Typical Ingredients and Formulation of Skin Moisturizers, 210
Considerations When Selecting Skin Moisturizers, 219
Typical Quality Issues of Skin Moisturizer Formulations, 220
Evaluation of Skin Moisturizing Products, 220
Packaging of Skin Moisturizers, 226
Glossary of Terms for Section 3, 226
Review Questions for Section 3, 227
References, 230

Section 4: Products for Special Skin Concerns – Aging and Acne. 232
Learning Objectives, 232
Key Concepts, 234
Introduction, 234
Part 1: Anti-Aging Products, 235
Drug or Cosmetic? 238
Typical Ingredients Used in Topical Anti-Aging Products, 238
Formulation Considerations for Topical Anti-Aging Products, 243
Formulation Challenges for Common Anti-Aging Ingredients, 247
Safety Issues Regarding the Use of Topical Non-invasive Anti-Aging Ingredients, 248
Part 2: Anti-Acne Products, 249
Causes of Acne and Potential Exacerbating Factors, 251
Symptoms and Types of Acne Vulgaris, 253
Treatment of Acne Vulgaris, 255
Formulation Considerations, 259
Ingredients Causing Safety Concerns, 260
Glossary of Terms for Section 4, 261
Review Questions for Section 4, 262
References, 265

Section 5: Sun Care Products, 273
Learning Objectives, 273
Key Concepts, 274
Introduction, 275
Sun Protection Basics, 275
Sun Protection Factor (SPF), 278
Broad-Spectrum Protection, 280
Water Resistance, 281
Effects of Ultraviolet Radiation on the Human Body, 281
Types and Definition of Sun Care Products, 283
History of Using Sun Care Products, 284
Required Qualities and Characteristics and Consumer Needs, 285
Sunscreens, 286
UV Filters, 286
Additional Ingredients of Sunscreens, 288
Product Forms, 289
Optimizing Product Efficacy and Consumer Acceptance, 291
After-Sun Preparations, 293
Typical Quality Problems of Sun Care Products, 294
Evaluation of Sun Care Products, 295
Packaging of Sun Care Products, 303
Glossary of Terms for Section 5, 304
Review Questions for Section 5, 306
References, 309

Section 6: Deodorants and Antiperspirants, 315
Learning Objectives, 315
Key Concepts, 316
Introduction, 317
Anatomy and Physiology of Human Sweat Glands, 317
Types and Definition of Products Reducing Body Odor, 319
History of Using Deodorants and Antiperspirants, 320
How Deodorants and Antiperspirants May Affect the Human Skin and Body? 321
Required Qualities and Characteristics and Consumer Needs, 322
Types of Ingredients, Product Forms, and Formulation of Deodorants and Antiperspirants, 323
Typical Quality Problems of Deodorants and Antiperspirants, 329
Evaluation of Deodorants and Antiperspirants, 331
Packaging of Deodorants and Antiperspirants, 336
Glossary of Terms for Section 6, 336
Review Questions for Section 6, 337
References, 339

4 Color Cosmetics 345

Section 1: Lip Makeup Products, 346
Learning Objectives, 346
Key Concepts, 347
Introduction, 348
Anatomy and Physiology of Human Lips, 348
History of Using Lip Makeup Products, 349
Types and Definition of Lip Makeup Products, 350
How Lip Makeup Products May Affect the Human Lips? 352
Required Qualities and Characteristics and Consumer Needs, 352
Typical Ingredients of Lip Makeup Products, 353
Typical Lipstick Types, 356
Formulation of Lip Makeup Products, 356
Typical Quality Problems of Lip Makeup Products, 360
Evaluation of Lip Makeup Products, 363
## Section 2: Eye Makeup Products, 371
### Learning Objectives, 371
### Key Concepts, 372
- Introduction, 372
  - Anatomy and Physiology of Human Eyelids and Eyelashes, 373
  - History of Using Eye Makeup Products, 374
  - Types and Definition of Eye Makeup Products, 375
  - How Eye Makeup Products May Affect the Eye Area?, 375
  - Required Qualities and Characteristics and Consumer Needs, 377
  - Typical Ingredients and Formulation of Eye Makeup Products, 378
  - Typical Quality Problems of Eye Makeup Products, 385
- Evaluation of Eye Makeup Products, 386
- Packaging of Eye Makeup Products, 391

### Glossary of Terms for Section 2, 392
### Review Questions for Section 2, 393
### References, 395

## Section 3: Facial Makeup Products, 397
### Learning Objectives, 397
### Key Concepts, 398
- Introduction, 398
  - Types and Definition of Facial Makeup Products, 399
  - History of Using Facial Makeup Products, 400
  - How Facial Makeup Products May Affect the Skin?, 400
  - Required Qualities and Characteristics and Consumer Needs, 402
  - Typical Ingredients and Formulation of Facial Makeup Products, 403
  - Powder Makeup Products for the Face, 403
  - Typical Quality Problems of Facial Makeup Products, 410
  - Evaluation of Facial Makeup Products, 410
- Packaging of Facial Makeup Products, 411

### Glossary of Terms for Section 3, 412
### Review Questions for Section 3, 413
### References, 414

## Section 4: Nail Care Products, 416
### Learning Objectives, 416
### Key Concepts, 417
- Introduction, 417
  - Anatomy and Physiology of Human Nails, 418
  - History of Using Nail Care Products, 420
Types and Definition of Nail Care Products, 421
How Nail Care Products May Affect the Human Nails?, 422
Required Qualities and Characteristics and Consumer Needs, 423
Functional Nail Care Products, 424
Typical Quality Problems of Nail Care Products, 433
Evaluation of Nail Care Products, 434
Packaging of Nail Care Products, 439
Glossary of Terms for Section 4, 440
Review Questions for Section 4, 441
References, 443

5 Hair Care Products 447

Introduction, 447

Section 1: Hair Anatomy and Physiology, 448
Learning Objectives, 448
Key Concepts, 449
  Introduction, 449
  Structure and Function of Human Hair, 450
  Hair Growth Cycle and Hair Loss, 453
  Chemical Composition of Human Hair, 455
  Physical Properties of Human Hair, 457
  Hair Weathering, 457
  Hair Types, 458
Glossary of Terms for Section 1, 460
Review Questions for Section 1, 461
References, 463

Section 2: Hair Cleansing and Conditioning Products, 464
Learning Objectives, 464
Key Concepts, 465
  Introduction, 466
  Types and Definition of Hair Cleansing and Conditioning Products, 466
  History of Using Shampoos and Hair Conditioning Products, 467
  How Hair Cleaning and Conditioning Products May Affect the Hair and Scalp?, 467
  Required Qualities and Characteristics and Consumer Needs, 469
  Hair Cleansing Products, 470
  Hair Conditioners, 476
  Types of Conditioners, 478
  Typical Quality Problems of Shampoos and Hair Conditioners, 479
  Evaluation of Shampoos and Hair Conditioners, 480
  Packaging of Shampoos and Hair Conditioners, 482
Glossary of Terms for Section 2, 482
Anatomy and Physiology of the Human Oral Cavity, 548
Brief Review of the Most Common Oral and Dental Care Problems, 551
History of Using Oral and Dental Care Products, 553
Types and Definition of Oral and Dental Care Products, 554
How Oral and Dental Care Products May Affect the Teeth and the Oral Cavity? 555
Required Qualities and Characteristics and Consumer Needs, 556
Toothpaste, 557
\hspace{0.5em} Ingredients, 557
\hspace{0.5em} Rheology of Toothpaste Formulations, 563
\hspace{0.5em} Formulation of Toothpaste, 564
Mouthwash, 566
\hspace{0.5em} Ingredients, 566
\hspace{0.5em} Formulation of Mouthwash, 568
Other Products, 568
\hspace{0.5em} Tooth Whitening Aids, 568
\hspace{0.5em} Tooth Powders, 570
\hspace{0.5em} Dental Floss, 570
Typical Quality Problems of Oral and Dental Care Products, 571
\hspace{0.5em} Hardening, 571
\hspace{0.5em} Inappropriate Viscosity, 571
\hspace{0.5em} Grittiness, 572
\hspace{0.5em} Cloudy Solution, 572
Evaluation of Dental and Oral Care Products, 572
\hspace{0.5em} Quality Parameters Generally Tested, 572
\hspace{0.5em} Efficacy (Performance) Parameters Generally Tested, 573
\hspace{0.5em} Ingredients Causing Safety Concern, 574
Packaging of Dental and Oral Care Products, 575
Glossary of Terms for Chapter 6, 576
Review Questions for Chapter 6, 577
References, 580

7 Other Products 585

Introduction, 585

Section 1: Hair Removal Products, 586
Learning Objectives, 586
Key Concepts, 587
\hspace{0.5em} Introduction, 588
\hspace{0.5em} Brief Review of the Structure and Function of Human Hair, 588
\hspace{0.5em} History of Using Hair Removal Products, 589
\hspace{0.5em} Possible Methods for Removing Hair, 590
\hspace{0.5em} Types and Definition of Hair Removal Products, 594
\hspace{0.5em} How Hair Removal Products May Affect the Skin and Hair? 595
CONTENTS

Required Qualities and Characteristics and Consumer Needs, 597
Product Types, Typical Ingredients, and Formulation of Hair Removal Products, 598
Typical Quality Problems of Hair Removal Products, 607
Evaluation of Hair Removal Products, 607
Packaging of Hair Removal Products, 608
Glossary of Terms for Section 1, 608
Review Questions for Section 1, 609
References, 611

Section 2: Baby Care Products, 613
Learning Objectives, 613
Key Concepts, 614
Introduction, 615
Anatomical and Physiological Differences between Baby and Adult Skin and Hair, 615
Types and Definition of Baby Care Products, 618
History of Using Baby Care Products, 618
How Baby Care Products May Affect Baby Skin and Hair?, 619
Required Qualities and Characteristics and Consumer Needs, 621
Types, Typical Ingredients, and Formulation of Baby Care Products, 621
Typical Quality Problems of Baby Care Products, 629
Evaluation of Baby Care Products, 629
Packaging of Baby Care Products, 631
Glossary of Terms for Section 2, 632
Review Questions for Section 2, 632
References, 634

Section 3: Sunless Tanning Products, 639
Learning Objectives, 639
Key Concepts, 639
Introduction, 640
Types and Definition of Sunless Tanning Products, 640
History of Using Sunless Tanning Products, 641
Required Qualities and Characteristics and Consumer Needs, 641
How Sunless Tanners May Affect the Human Body?, 642
Sunless Tanning Products, 644
Formulation Concerns, 646
Typical Quality Problems of Sunless Tanning Products, 648
Evaluation of Sunless Tanning Products, 648
Packaging of Sunless Tanning Products, 649
Glossary of Terms for Section 3, 649
Review Questions for Section 3, 650
References, 651
Section 4: Feminine Hygiene Products, 653
Learning Objectives, 653
Key Concepts, 654
  Introduction, 655
  Anatomy and Physiology of the Female Genital Area, 655
  Types and Definition of Feminine Hygiene Products, 658
  History of Using Feminine Hygiene Products, 659
  How Feminine Hygiene Products May Affect the Human Body and
  Genital Area? 660
  Required Qualities and Characteristics and Consumer Needs, 662
  Types, Typical Ingredients, and Formulation of Feminine Hygiene
  Products, 663
  Typical Quality Problems of Feminine Hygiene Products, 668
  Evaluation of Feminine Hygiene Products, 668
  Packaging of Feminine Hygiene Products, 670
Glossary of Terms for Section 4, 671
Review Questions for Section 4, 672
References, 674

Key for Review Questions 679

Index 685